

# Bed Bugs in Schools

History, Biology, Medical  
Symptoms, Inspections,  
Prevention and Control.

# The History of Bed Bugs in America

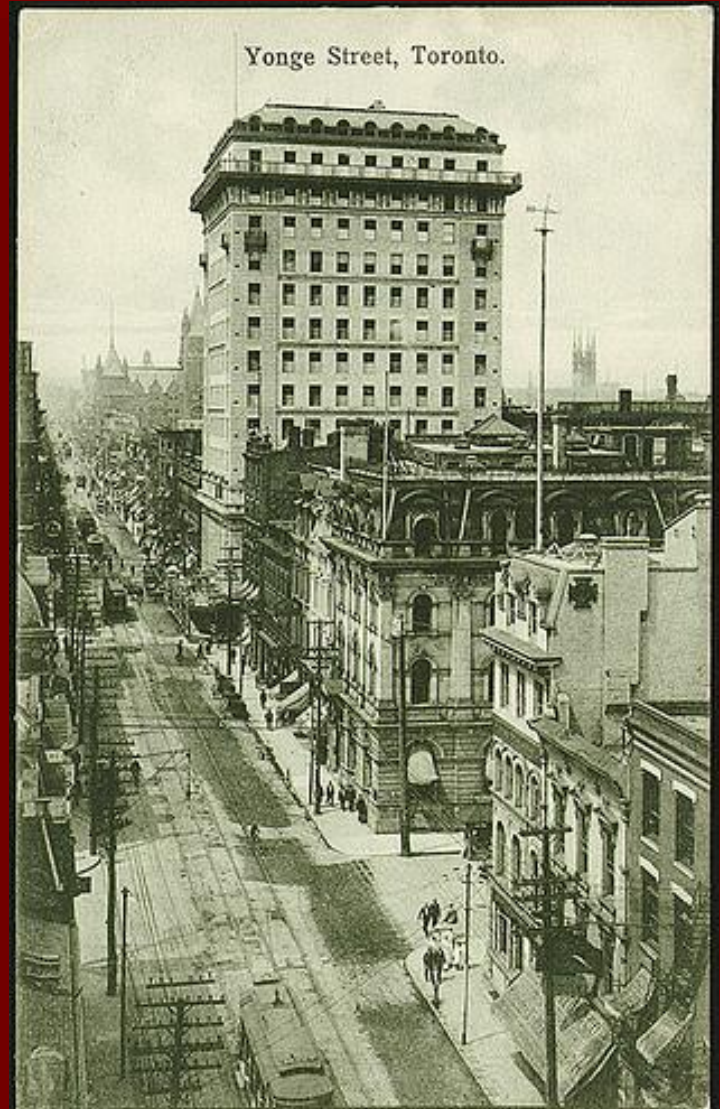
- Introduced by early colonists in the 18<sup>th</sup> century.
- Old sailing ships were notoriously infested.
  - Some ships did not allow passengers to bring bedding on board.



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# Early 20<sup>th</sup> Century

- Bed Bugs were rated among the top 3 pests in and around structures.
- As many as 1/3 of all residences were infested with bed bugs in some cities
  - Lower income areas were even worse.



# The Introduction of DDT

Bed bugs finally met their match.

- DDT sprayed on and around the bed would control bed bugs for a year or more!
- By the mid-1950's, bed bugs went from a major pest to a rare pest in depressed settings.





# Evidence of Bed Bug Resurgence

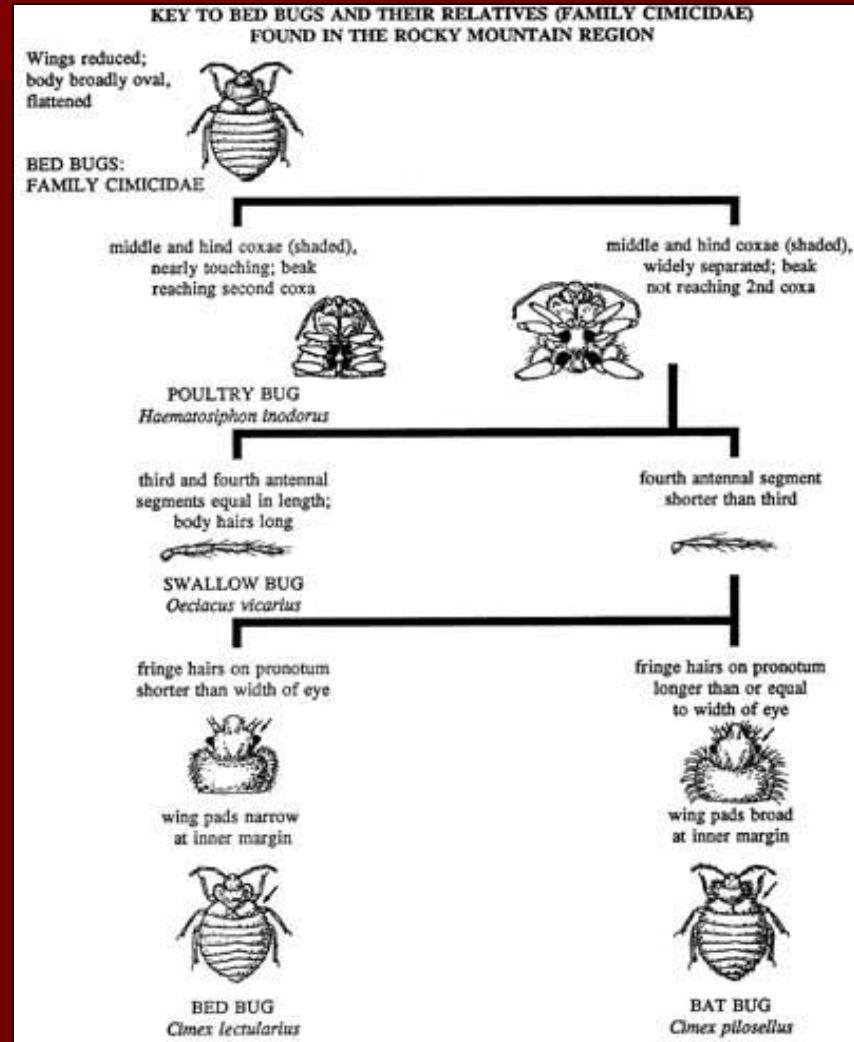
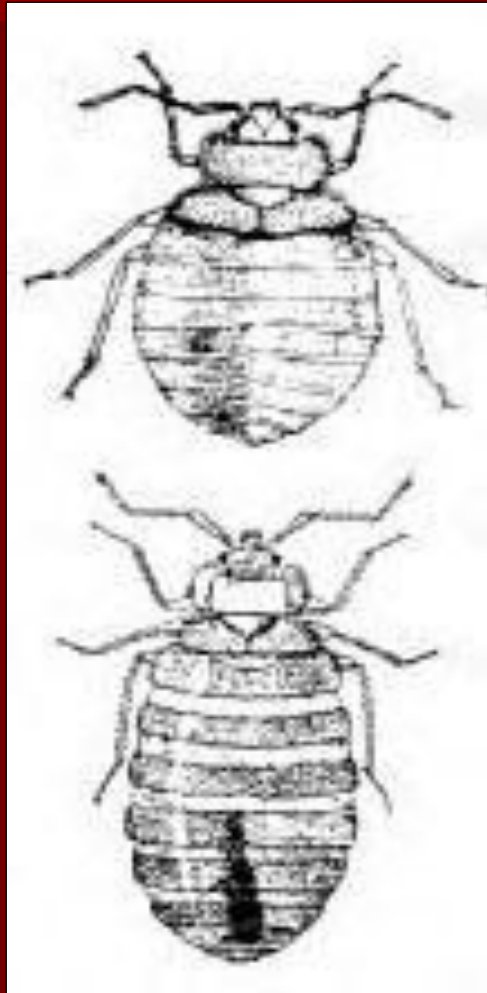
- Orkin reported a 500% increase in bed bug calls from 2002-2003.
- Orkin reported another 20% increase of calls in 2004.
  - Treated for bed bugs in 8 U.S. states in 2003.
  - Treated for bed bugs in 43 U.S. states in 2004.
  - **Bed bugs are now found in all 50 states.**

# Possible Factors In Bed Bug Resurgence

1. Greater human mobility
2. Less use of any residuals – last 5-6 yrs
3. Significant switch to baits for roaches & ants
4. Many PMPs are not familiar w/ bed bugs
  - inadequate survey, wrong ID, incomplete treatment
5. Pyrethroids used in most accounts are repellent
  - bugs do not get a lethal dose (esp. in deep cracks)
  - harborages easy to miss in first survey
  - bugs may detect & avoid residual treatments
  - bug pop. often “split” or move from such treatments
6. People may call any unknown bite - “bed bugs”
7. No “magic bullet” insecticides
  - DDT and other chlorinated hydrocarbon insecticides are long gone.

# Family: *Cimicidae*;

## The Bedbugs and their kin



# Principles of Integrated Pest Management

- Identify the pest
- Understand the biology and behavior of the pest and determine if control is needed
- Know the available control measures and evaluate their usage
- Implement safe and effective control tactics
- Evaluate and monitor control efforts.



# Bed Bug Biology

- Order Heteroptera
- Adults 3-4 mm in length
- Common worldwide
- Simple metamorphosis:  
egg, nymphs, adult
- Crack/crevice harborage;  
furniture, bedding

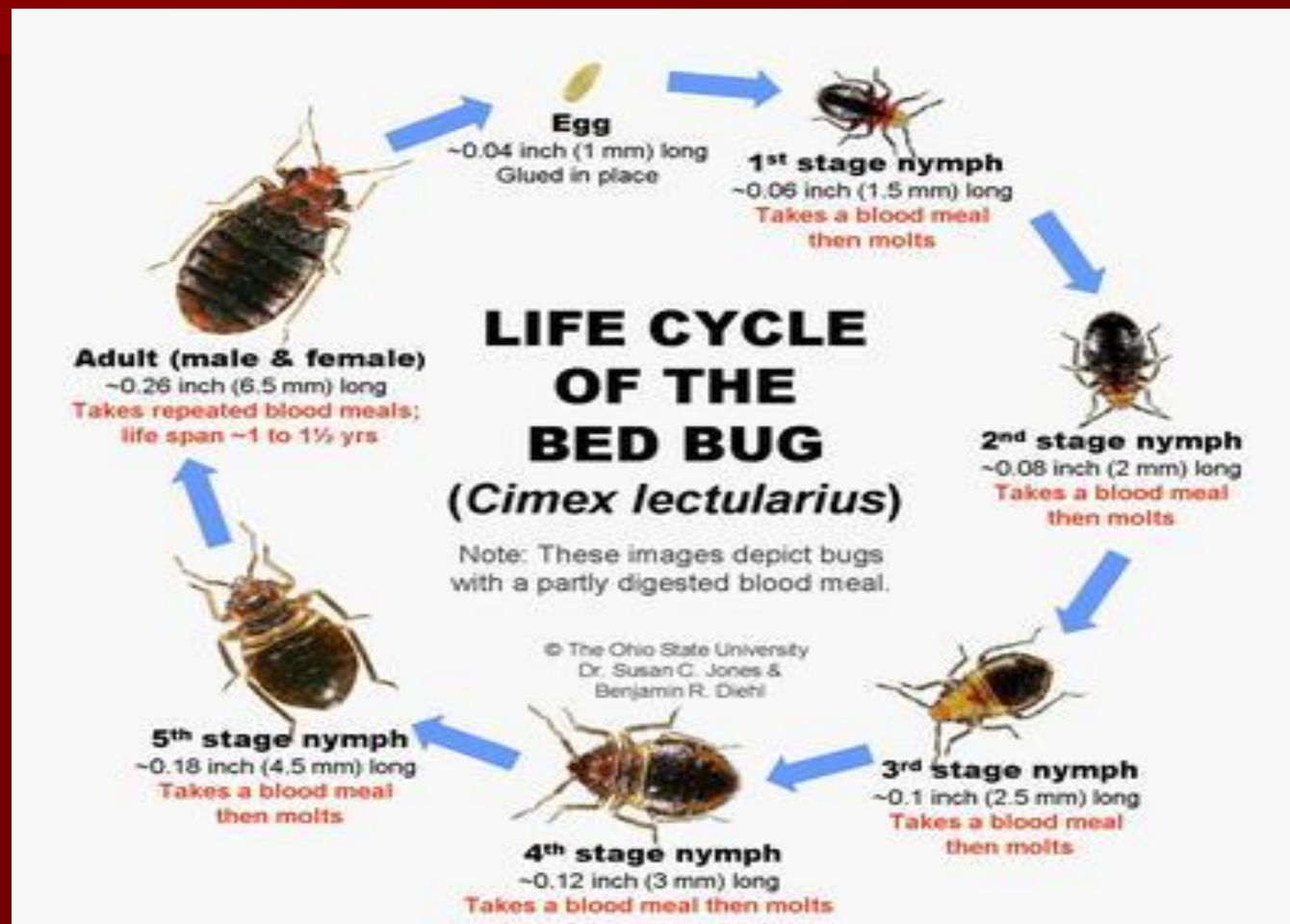


Ill. From "Monograph on Cimicidae", by R.L. Usinger

# Bed bug Biology

- Introduced via luggage, furniture, bedding
- Lay 2-3 eggs daily, glued in place (250/lifetime)
- Both males and females feed on blood
- Peak feeding time before dawn.
- Take blood meal every 5-10 days
- May feed on non-human hosts
- May survive 10 months without blood meal
- May move to adjacent rooms/units to feed
- Resurgence as a result of increased travel and changes in cockroach treatment techniques

# Life Cycle





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## Eggs and Nymphs



**Nymphs and Adults**

Photo by V. Jedlicka, UNL Extension in Lancaster County

## **Adult Bedbug**







**Engorged Adult**

# Medical Symptoms

- Bites vary from person to person
- May have immediate reaction or may take up to 2wks
- Welts, Itchiness, Swelling
- Inflammation, sensitivity over time
- Anxiety, Annoyance, Insomnia

**Fortunately, there is no disease threat  
From bed bug infestation**

# Feeding a “Rearing Jar”



# Immediate Bite Reactions





# Delayed Reactions (> 24 hrs.)



# Signs of Infestation

- Fecal spots
- Exuviae (shed skins) in harborage areas
- Blood spots
- Sweet, musty “bug” smell in heavy infestations
- Appearance of the bugs themselves

Fecal stains on  
mattress







**Bedbug adults, nymphs, and exuviae**

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## **Bedbugs at carpet/baseboard interface**



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A close-up photograph of a wooden bed-frame joint. The wood is light-colored with a visible grain. A dark, irregular line of small, dark spots, identified as bed bugs, follows the joint where two wooden pieces meet. A circular metal fastener or bolt head is visible on the lower part of the wood.

harborage in  
Bed-frame joint

Photo by B. Ogg, UNL Extension in Lancaster County





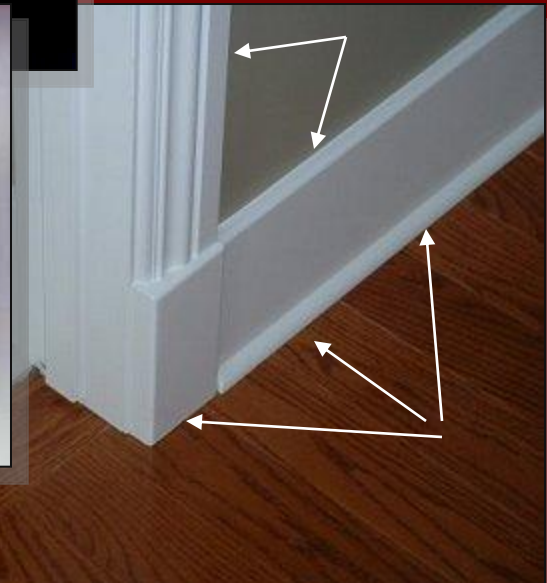
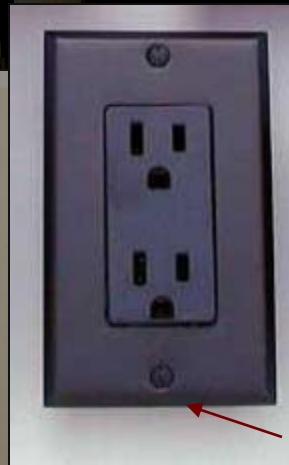
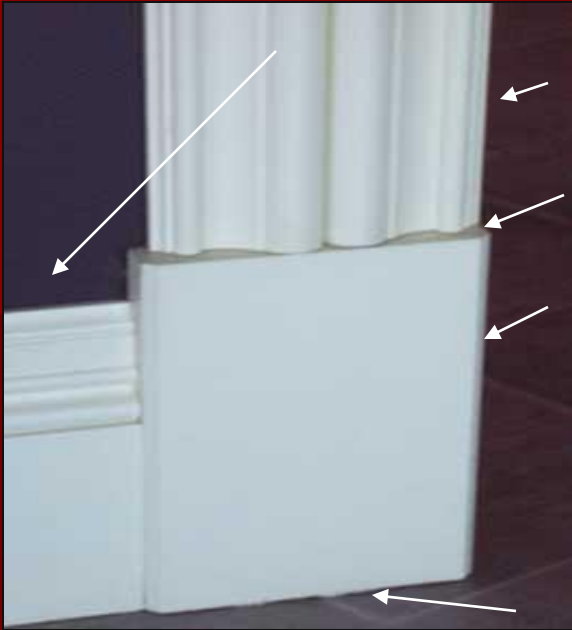
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# Bed bug habitat and harborage areas

- Crevices behind mouldings
- Joints in hardwood floors
- Behind picture frames
- Joints in bed-frames
- Joints in furniture
- Electrical outlets
- Behind loose wallpaper
- Behind paneling or joinery
- Mattress seams
- Pillows



## Examples of crack & crevice harborage





# How do I prevent bed bugs in my school?





# Bed Bug Prevention Methods

- *Clutter Removal* - Clutter is the bed bug's best friend. If clutter is a problem at your school, next school break make it a priority to reduce unused items.
- *Limit the Items Being Brought to School* - Repeatedly transporting items between school and home also increases the possibility of students carrying bed bugs to school.

# Remove Clutter

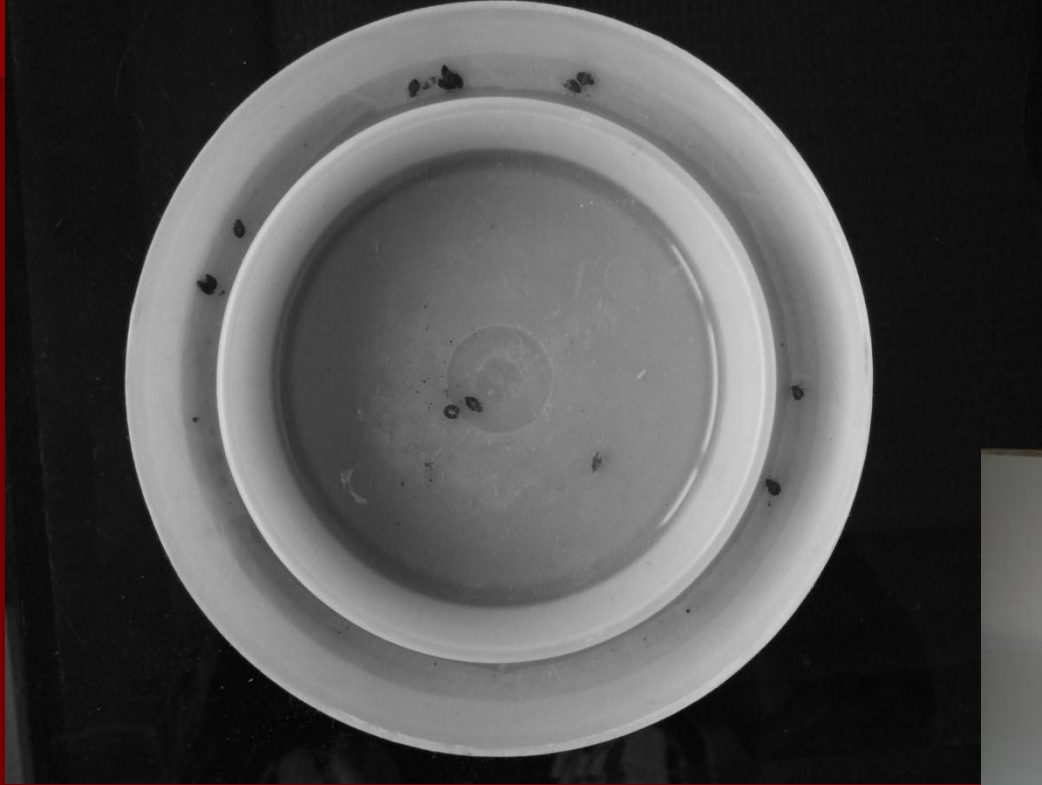


Can you find any harborage areas in this room?

# Bed Bug Prevention Methods

- *Containing Bed Bug Introductions* - Clear plastic storage containers can be used to store backpacks, lunch containers, coats and other cold weather gear while the student is in the classroom.
  - When the students leave for the day, the containers should be visually inspected for any signs of bed bugs.

# Use Monitoring and Inspection as part of Prevention





# Introduction vs. Infestation

- Introduction

- Finding a bed bug on a student or their belongings is most likely an introduction.


- Infestation

- Multiple life cycle stages may be present.

- Overreaction can cause panic and lead to bad decisions!

# Education is key.

- Prevents panic.
- Allows decision making.
- Education has proved to slow the spread of bed bugs.
- You are an educational institution.



**Prevention & Control**

## Bed Bugs

(Cimex lectularius)

Bed bugs are small, flat insects that feed on the blood of sleeping people and animals. They are reddish-brown in color, wingless, and 1/16 to about 1/4 of an inch long. Bed bugs can live more than a year without feeding. However, they do not transmit disease to people. They hide in dark places, easily spread from one location to another, and can "hitch a ride" on clothing, backpacks, luggage and furniture. If you suspect you have bed bugs, collect one or more and have them identified by a qualified professional. If bed bugs are confirmed, call a pest management professional. It is often beneficial to install encasements on mattresses and box springs, and bed bug traps under bed legs.

**Check**

- ✓ Check the seams of your mattress, look for black/brown spots (bed bug feces).
- ✓ Check for small blood stains on sheets.
- ✓ Check for their shed "skins" which are amber-colored.
- ✓ Check your face, neck, arms and other body parts for bite marks.
- ✓ Check mattress seams, box springs, bed frames, chairs, edges of rugs and carpets, drawers, baseboards, backpacks, sleeping bags and clothes.

**Contain**

- ✓ When staying in a hotel, check the room first and protect clothes and luggage by sealing them in garbage bags or other tight-sealing bags.
- ✓ Make sure to keep luggage off the floor, chairs and bed.
- ✓ Do not pick up items from dumpsters or the street - they may be infested.
- ✓ Be cautious when purchasing used furniture and clothing.
- ✓ Seal clothes in plastic bags until you can wash and dry them.

**Clear**

- ✓ As much as possible, eliminate clutter that provides hiding places for bed bugs.
- ✓ Wash clothes and dry on high.
- ✓ Vacuum beds, under beds, and other hiding places. Empty vacuumed matter immediately, seal it in a garbage bag, and put it in the trash. Don't let bed bugs "hitchhike" on vacuum cleaners.

# Inform parents when a bed bug is found

**\*\* SAMPLE \*\***  
**Bed Bug Inspection Report**

Dear Parent,

Today, a bed bug was found on your child or in your child's belongings. While this does not necessarily mean that the bed bug was brought to school by your child, it is important to your child's health and to the school community that you inspect your home for signs of bed bugs. Enclosed you will find information about bed bugs and an identification guide to help you with your inspection. Once you have inspected your home, please fill out the form below and return to the school office by \_\_\_\_\_.

Sincerely,

School Administration

---

I have been informed that a bed bug was found on my child at school. I understand that bed bugs pose a threat to my child's well-being and to the greater school community. I have read and understood the educational materials provided to me regarding bed bugs, and have:

- ☐ carefully checked my family and home for signs of bed bug infestation myself
- ☐ hired a pest management professional to check my family and home for signs of bed bug infestation. Name of pest control company: \_\_\_\_\_

After completing a careful inspection, I certify that to the best of my knowledge:

# Bed Bugs Found in a Classroom

## Parent Notification Letter

*(Use appropriate school letterhead)*

Dear Parent or Guardian:

We recently found a bed bug in your child's classroom. Bed bugs are a nuisance, but their bites are not known to spread disease. Bed bugs are usually active at night and feed on human blood. The bite does not hurt at first, but it may become swollen and itch, much like a mosquito bite. Watch for clusters of bites, usually in a line, on exposed areas of the body. If you have medical concerns for you or your child, please contact your doctor.

The source of bed bugs often cannot be determined, as bed bugs may be found in many places including hotels, planes, and movie theaters. Even though it is unlikely for bed bugs to infest a school, *(fill in your school district here)* will conduct an inspection and, if needed, will implement an integrated pest management plan in the area where the bed bug was found.

*(Fill in your school district here)* will continue to work to identify bed bugs, provide thorough inspections of schools, and have licensed pest control specialists assist with pest management.

Contact your physician or school nurse for proper care and treatment of bed bug bites. If you have any questions regarding bed bugs in your school, please contact Principal *(add principal's name and contact info here)*. If you have any questions regarding bed

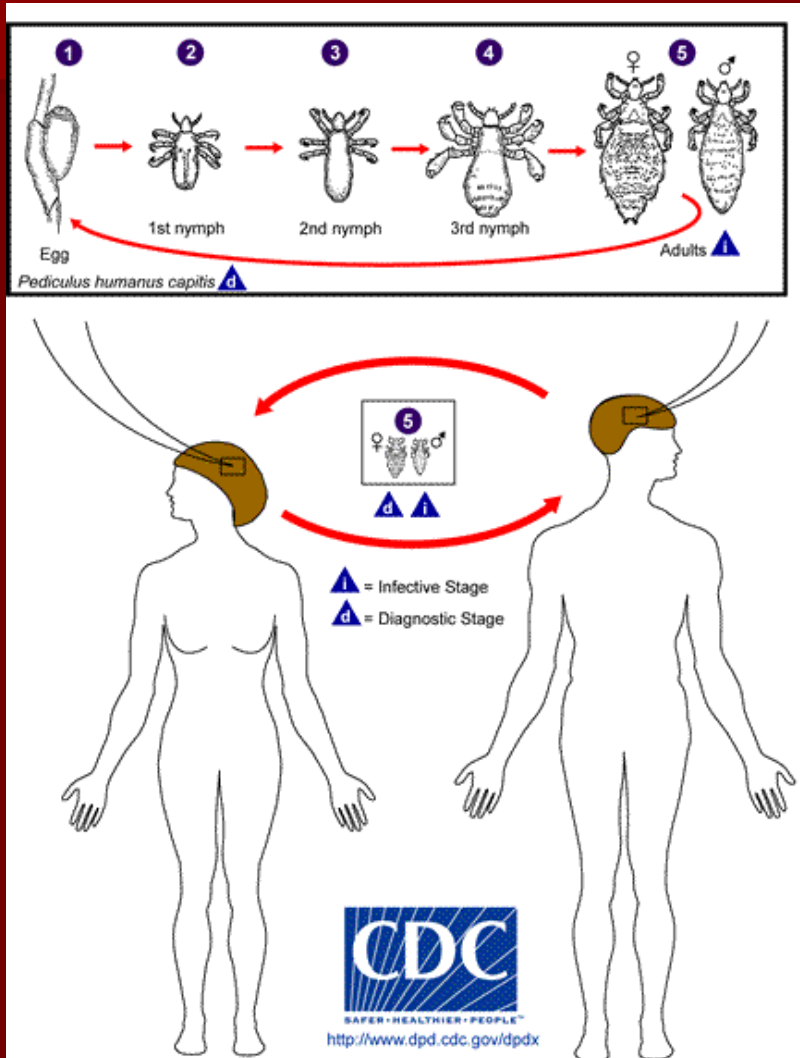


# Head Lice



Indiana State  
Department of Health

# Head Lice - Biology

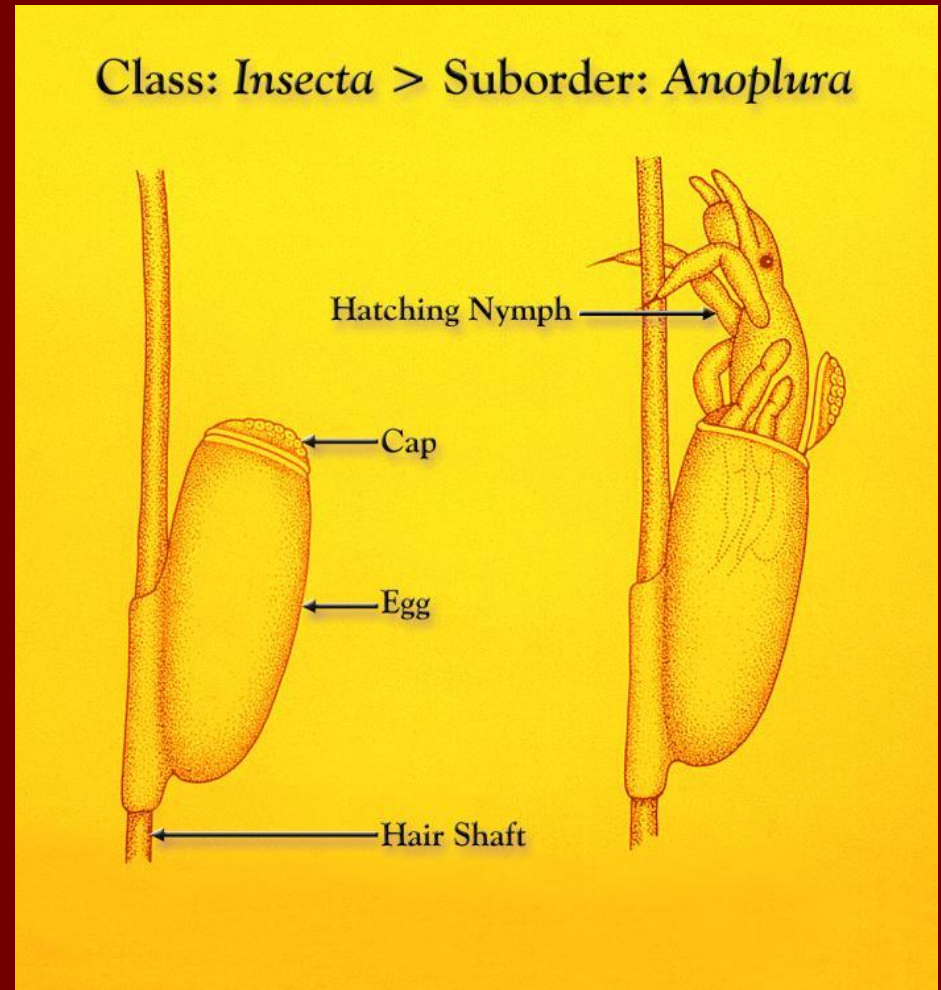


- Only host is human
- Feed on blood several times a day
- Remains close to scalp to maintain body temp
- Can not live long off of host
  - Adults die within a couple of days
  - Nits die within about a week

# Life Cycle

## ■ Eggs

- Called nits
- Difficult to see
- Cemented at base of hair shaft nearest scalp
- Take 6-9 days to hatch
  - Incubated by body heat
- 1/2" rule



# Life Cycle

- On persons with darker hair, louse will appear darker.

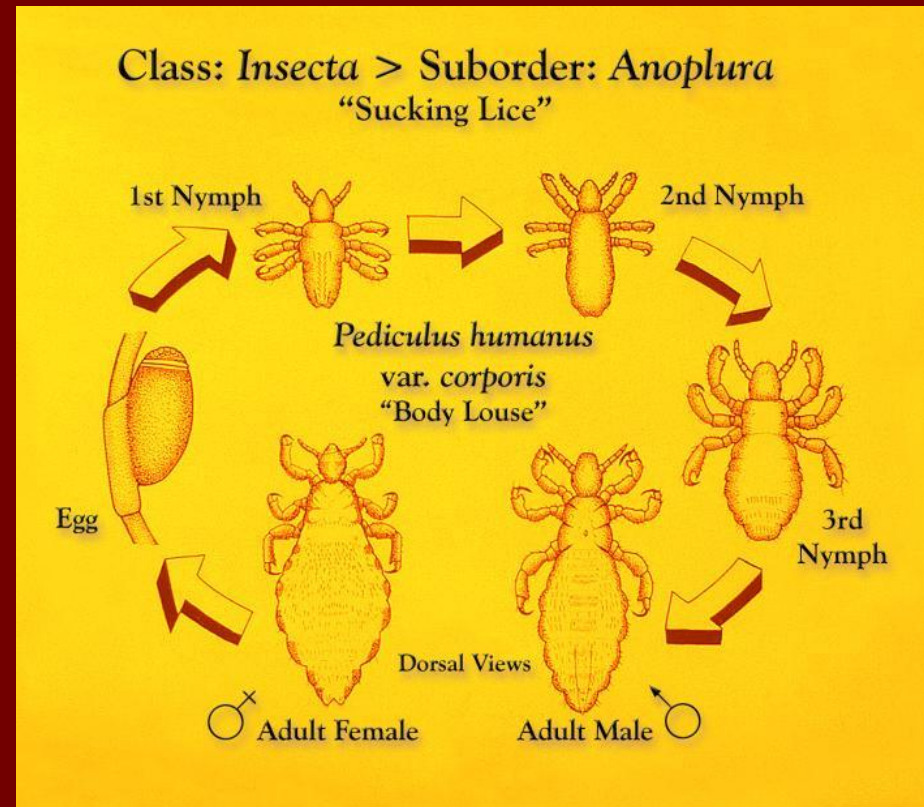




# Life Cycle

## ■ Nymphs

- Nit shell becomes a more visible dull yellow.
  - Remains attached to hair
- Looks like an adult but the size of a pinhead.
- 3 instars
- Become an adult 7-12 days after hatching.



# Life Cycle

## ■ Adults

- 6 legs, size of sesame seed.
- Tan to grayish-white.
- Females larger than males, lay up to 10 nits/day.
- Live up to 30 days on persons head.
- Feed on blood several times a day.



# Life Cycle

- Adults (cont.)
  - Without blood, die in 1-2 days off host.
    - Usually survive less than a day off scalp at room temperature.
  - Move by crawling. Cannot hop or fly.
  - Itching results from sensitization of saliva.
    - May not develop for 4-6 weeks.



# Diagnosis

- Head lice and nits can be visible with the naked eye
  - A magnifying lens might be needed to find crawling lice or to identify a developing nymph inside a viable nit
  - Nits are often confused with other particles found in hair such as dandruff, hair spray droplets, and dirt particles
- The diagnosis is best made by finding a **live** nymph or adult louse on the scalp or hair of a person



# Diagnosis

- Lice and nits are most often found at the nape of the neck, and above and behind the ears



# Diagnosis

- Using a louse comb is quicker and more efficient.



# Transmission

- Direct contact with head of infested individual.
- Indirect spread through personal belongings is much less likely, but may occur rarely.
- Lice on combs are likely to be dead or injured.
  - Healthy lice are not likely to leave a healthy head.
- One study – Live lice found on 4% of pillow cases of infected patients.
- Major focus of control activities should be to reduce the number of lice on the head and lessen the risks of head-to-head contact.

# Control

- Treating the Infestation
  - Recommended for persons diagnosed with an active infestation
  - All household members and other close contacts should be checked
    - Those persons with evidence of an active infestation should be treated.



# Control

## ■ Treatment methods

– OTC & Prescription pediculicides: FOLLOW LABEL DIRECTIONS!

- Retreatment of head lice usually is recommended because no approved pediculicide is completely ovicidal
- To be most effective, retreatment should occur after all eggs have hatched but before new eggs are produced
- The retreatment schedule can vary depending on the pediculicide used (Usually day 0 and again on day 9.)

# Control

## ■ Supplemental measures

- Hats, scarves, pillow cases, bedding, clothing, and towels worn or used by the infested person in the 2-day period just before treatment is started can be machine washed and dried using the hot water and hot air cycles because lice and eggs are killed by exposure for 5 minutes to temperatures greater than 128.3°F
- Items that cannot be laundered may be dry-cleaned or sealed in a plastic bag for two weeks
- Items such as hats, grooming aids, and towels that come in contact with the hair of an infested person should not be shared
- Vacuuming furniture and floors can remove an infested person's hairs that might have viable nits attached

# Control

- Avoid head-to-head (hair-to-hair) contact during play and other activities at home, school, and elsewhere (sports activities, playground, slumber parties, camp).
- Do not share clothing such as hats, scarves, coats, sports uniforms, hair ribbons, or barrettes
- Do not share combs, brushes, or towels. Disinfect combs and brushes used by an infested person by soaking them in hot water (at least 130°F) for 5-10 minutes
- Do not lie on beds, couches, pillows, carpets, or stuffed animals that have recently been in contact with an infested person

# Control Measures in Schools

- American Academy of Pediatrics and Nat'l Assoc. of School Nurses – “No-nit policies should be abandoned.”
  - Screening has not been proven to have a significant effect on the incidence of head lice in a school community over time.
  - Screening has not been shown to be cost-effective.
  - Infestations have been shown to have low contagion in classrooms.
  - School children are often inappropriately diagnosed.
    - Avg. of 20 missed school days/student.



# Control Measures in Schools

- Educating parents in diagnosis and treatment is helpful.
  - Providing information to parents is beneficial.
- Routine school-wide or classroom screening should be discouraged.
- Nurses should check heads when students are showing head lice infestation symptoms.

# More information...

- [www.pediatrics.org](http://www.pediatrics.org)
- CDC website.
- Questions?